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ABSTRACT

The Distar program, evaluated mainly in terms of pupil achievement and teacher opinion, was generally considered to be successful. Teachers indicated through attitude questionnaires that the lessons were enjoyable, that the students had made reasonable progress and had learned useful skills, and that the material was good and easy to use. The scope of the evaluation was limited by the small size of the groups, differences between classes, and inadequate pre-testing. (DLG)

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RESEARCH REPORT

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Research Report 71-16

Department of Planning and Evaluation
Board of School Trustees
1595 West 10th Avenue
Vancouver 9, B. C.

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TABLE OF CONTENTS

	Page
INTRODUCTION	1
A. Distar—What is it?	1
B. The Program in Vancouver	5
EVALUATION	5
A. Pupils' Achievement	6
B. Questionnaires to Distar Teachers	9
C. Class Observations	12
SUMMARY	12
APPENDIX A - Summary of Questionnaire Responses, January, 1971	14
APPENDIX B - The Teachers' Evaluation of Distar in June, 1971: Responses to a Questionnaire	17

EVALUATION OF DISTAR MATERIALS IN THREE JUNIOR LEARNING ASSISTANCE CLASSES

INTRODUCTION

A. Distar — What is it?

Distar[1] is an instructional system designed to teach basic skills and concepts in reading, arithmetic, and language. It is generally used with pre-school and primary grade children, but is designed to be used with any children who have not learned, for any reason, the basic skills they need in order to succeed in school. Distar was developed by Dr. S. Engelmann and his staff at the University of Illinois. It was first employed in "Head Start" projects for disadvantaged children. Since then it has been used with culturally disadvantaged children, older retarded pupils, children with language difficulties, and pre-school children. The results of using Distar have generally been good. After using Distar, children score higher on I.Q. tests, and they can read, do arithmetic and understand their teachers. The results of using Distar in other school systems are summarized in the following paragraphs.

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[1] Distar (Direct Instructional System for Teaching Arithmetic and Reading) is published by Science Research Associates, Inc., Chicago, Illinois, 1969.

Background information about Distar is taken from three main sources:

(a) A binder of printed information on Distar which includes background information and "Distar Case Study Summaries"—published by Science Research Associates, Inc., Chicago, Illinois.

(b) Distar Orientation: Participant's Manual, Chicago, Ill., Science Research Associates, Inc., 1970.

(c) A Conference on Distar, March 12, 1971, Sponsored by Science Research Associates, Villa Motor Inn, Burnaby, B. C.

Distar[2] was first used to teach disadvantaged children in the Head Start program in Champaign, Illinois. The children using Distar made significant gains in I. Q. over a two-year pre-school period. Other Head Start programs had found that the I. Q. gains in the first year drop off during kindergarten. By the time the Distar children entered Grade 1 they were performing at or above the level of their peers and thus were spared the failure that many disadvantaged children experience in school.

In another project[3], the children on Distar improved their skills significantly even with teachers who were negative about the program. Changes in I. Q. were greater and more stable for pupils using Distar than for those in other pre-school and kindergarten programs. This applied whether Distar was used at the pre-school or kindergarten level; children who had used Distar for two years had the greatest gains. The teachers' attitudes changed also: those who had been negative toward Distar liked it by the end of the year.

Distar was used in a first grade class in California as part of a program to improve reading[4]. After using Distar for one year, the children in this class scored above the state norms. A study[5] on functionally retarded, disadvantaged, pre-school children found that children in "special" pre-school programs, including Distar, had greater I. Q. gains than children in a control group.

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[2]Distar Case Study Summary 2, S. R. A.
[3]Distar Case Study Summary 3, S. R. A.
[4]Distar Case Study Summary 4, S. R. A.
[5]Distar Case Study Summary 5, S. R. A.

Distar was used[6] in a Cincinnati school in an attempt to improve reading, arithmetic, and language skills of disadvantaged pupils. The achievement of Grade 1 pupils who used Distar was not significantly different from that of pupils in the control group; achievement of the Grade 2 pupils using Distar was significantly higher than their "controls". Teachers' assessments of how well the program achieved its objectives were high.

A basic assumption of the Distar programs is that any child can learn the skills he needs, if he is properly taught. Children will proceed through the Distar program at different rates, but all will learn the material.

Distar is designed for small groups of children since student participation and individual instruction are considered important. In most classes, children are grouped by performance levels, e.g., group A may be on lesson 60 when group B is on lesson 100. This grouping is supposed to be flexible so that children can move from one group to another depending on how well they are doing.

Distar is a highly structured instructional system. One lesson, approximately thirty minutes in length, is taught every day. The lessons are carefully sequenced so that basic skills are mastered before more complex ones are introduced. Each lesson is composed of several tasks, e.g., a reading lesson may include reading sounds, rhyming, spelling by sounds, and a story on the "Take-Home" sheet. There are group activities, individual activities and Take-Home for each lesson.

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[6]Direct Instructional System for Teaching Arithmetic and Reading, Journal of Research and Development, July, 1970, Vol. 5 No. 4, pp. 65-76 (Cincinnati Public Schools).

The Take-Homes are sheets, e. g., printing practice and a story, which the children complete in class and take home as a reward for working hard and learning the lesson. There are set formats for the presentation of tasks and definite signals to cue responses from the children. The teachers' books specify exactly what the teacher is supposed to say and do, what responses to expect from the children, the procedures for correcting errors, etc. Evaluation tests throughout the programs serve to indicate whether each child has learned the material in the preceding lessons. If a test is failed by more than a specified number of pupils, lessons are repeated. The teachers' book specifies criteria for failing and lessons to be repeated. Children who repeatedly fail are put into a lower performing group.

There are three sets of Distar materials: Language, Reading and Arithmetic. The three Distar programs can be used separately or together. Without an aide or team teaching, it is difficult to use more than one Distar system in a class. Much depends on how well the class is organized since the teacher has to teach each Distar lesson for one-half hour and the other children must be working quietly during this time.

At the present time, there are two levels in each of the three subject areas. The first part, Distar I, teaches basic skills, while Distar II coordinates and extends the skills. All children do not complete Distar I in one school year. It is advantageous to use both levels of Distar since they make a more complete program.

Distar Language focuses on the language concepts and skills a child must know in order to understand the teacher and what she teaches. Distar Arithmetic teaches the same skills as other arithmetic programs but the method of teaching is different. Arithmetic concepts and operations are taught in small steps so that the children can progress quickly and become competent in solving arithmetic problems. The sequence in which skills are taught is not the same as in other programs. Distar Reading teaches the decoding and word-attack skills of reading. The children learn the symbols as sounds first; they learn to spell by sounds, blend sounds, etc., long before they are introduced to the alphabet.

B. The Program in Vancouver

Distar was used in Vancouver during the 1970-71 school year in three Junior Learning Assistance Classes. Distar Reading was taught at Hudson School; Distar Arithmetic at Douglas Annex; and Distar Language at Tecumseh Annex. The Distar Reading class was divided into three groups; the Language and Arithmetic classes each worked as one group. A total of 25 pupils were involved in the program regularly for the full school year. Several other children used Distar irregularly or for part of the year.

The main objective in using the Distar materials in these classes was to teach the children the basic skills and concepts in the three subject areas.

EVALUATION

Several types of data were collected for the evaluation. Standardized tests measuring cognitive skills and reading were given to the pupils in January and May. The teachers responded to questionnaires about their use of Distar,

their opinions of the program, and their pupils' achievement. Meetings and class observations provided further information. The data are summarized below.

A number of problems made the evaluation of Distar difficult. These problems limit the validity of comparisons among classes and generalizations about Distar.

The sample of children was small (25) and biased. The classes differed in size and abilities. (The 5 pupils in the Distar Arithmetic group were the bottom half of the class.) The children in the classes varied in age, educational experience, and in the nature of their problems.

It was also difficult to isolate the teacher effects from the effects of the program. The differences among the teachers in their use of Distar and in their class management must be considered.

Another problem was that of finding suitable tests. The available tests usually do not measure only reading or arithmetic skills as results also depend on the pupil's ability to follow directions, to sit still, etc. Also, an arithmetic test may depend on reading ability. Characteristics of the Distar materials themselves make it hard to apply standardized tests. Distar Reading I does not use strictly traditional orthography and Distar Arithmetic presents material in a different format from that of more traditional programs. Finally, the inadequate pre-testing made it difficult to assess the relative gains of different groups.

A. Pupils' Achievement

Some attempt was made to assess the pupils' achievement in the subjects taught with Distar materials. The pupils' progress (i. e., the lesson reached in the

program), the teachers' evaluations, and the results of testing were examined.

Because of the problems mentioned above, the test results do not give a clear picture of the children's achievement. The results are incomplete and must be interpreted cautiously.

The Canadian Cognitive Abilities Test (CCAT) Primary 2, Form 1, was given to the pupils in January and May, 1971. This test measures cognitive skills which are important to progress in school. The four subtests measure: vocabulary, quantitative concepts and relationships basic to arithmetic, the ability to use relational concepts, and the ability to categorize and classify objects. Scores on the test also depend upon ability to follow directions and to pay attention to a task. Since it is a language oriented test, we would expect that the Distar Language group would make the greatest gain. The results of the subtest on quantitative concepts were examined separately to see if the Distar Arithmetic group had made gains in skills related to arithmetic.

Twenty-four children were given the CCAT as pre- and post-tests: nine in Distar Reading, ten in Distar Language, and five in Distar Arithmetic. The scores (total scores and deviation I.Q. scores) for each group are shown in Table I. Over the 5-month period, the Distar Reading and Language groups made significant gains in total scores and in the corresponding deviation I.Q. scores. It can be seen from the table that the three groups had quite different mean scores. The Language group had the highest mean scores; the Arithmetic group, the lowest. This order of scores (Language highest, then Reading, then Arithmetic) was the same for pre- and post-tests for total and deviation I.Q. scores. An analysis of variance showed there was a significant difference among the groups on the pre-test ($F=13.09$, $p = .01$) and on the post-test ($F=17.63$, $p = .01$).

TABLE I: MEAN SCORES FOR THE THREE DISTAR GROUPS ON THE CANADIAN COGNITIVE ABILITIES TEST GIVEN IN JANUARY AND JUNE, 1971, TO PUPILS IN THREE JUNIOR LEARNING ASSISTANCE CLASSES

		Reading (N=9)	Language (N=10)	Arithmetic (N=5)
Mean Total Score	Pre	33.7 **	43.5 **	21.6 n. s. d.
	Post	41.0	50.8	26.6
Mean Deviation I. Q.	Pre	56.3 *	67.6 **	49.6 n. s. d.
	Post	61.0	74.3	48.6
Mean Gain on Arithmetic Subtest		1.7	2.9	1.6

** Change is significant at the .01 level

* Change is significant at the .05 level

n. s. d. No significant difference

The change scores between pre- and post-tests for the three groups were compared by means of an analysis of variance. There was no significant difference among the groups, i. e., no group made significantly larger gains than the others. There was also no significant difference among the groups in gains in scores on the quantitative subtest.

It is very difficult to interpret these results. The small size of the groups and the marked difference between them on the pre-test makes it hard to assess any changes or make any generalizations. The deviation I. Q. scores are approximations since there were some children older than the age norms and several who were in the "below 50" category.

Almost all children increased their scores; 63% of the pupils showed a gain in deviation I. Q. scores. The Language and Reading groups showed greater gains than the Arithmetic group. The Arithmetic group did not show larger gains than the others on the subtest related to arithmetic.

A few pupils in each class were given the reading subtests (Word Knowledge, Word Discrimination, and Reading) of the Metropolitan Achievement Test, Primary I Battery in January and April, 1971. All children who were tested received higher scores on the post-test than on the pre-test. The two children in the Reading group made the largest gains. These gains were not put to any statistical test for significance because of the very small number of pupils (6) and the manner in which they were selected.

Another indicator of the pupils' achievement is the number of lessons completed. All but one pupil in the Distar Reading class completed the 159 lessons by the beginning of June. Three of them were well into Distar Reading II. The Distar Language class completed the 180 lessons in one book but progress was somewhat slower in the other two books. The Distar Arithmetic group had done 143 of the 220 lessons by June 1. This seems to the writer to be quite reasonable progress for pupils in special classes, particularly in view of the difficulties of the initial year.

The teachers felt that the pupils were achieving well in their Distar subjects. In their responses to the questionnaire (see Appendix B) they listed useful skills that the children had learned.

B. Questionnaires to Distar Teachers

The three teachers using Distar were given a questionnaire in January, 1971. Their responses are summarized below.

In general, the teachers seemed quite positive about Distar. All three teachers indicated that:

- they liked Distar
- they would like to use it again
- they would like to teach another Distar subject
- they would like to use more than one Distar subject if they had more help
- the children were learning the Distar material
- Distar is a good method of teaching
- the Take-Homes were effective.

For the most part they felt that:

- Distar taught what they wanted it to teach
- Distar was not difficult to use
- the tests in the program were a good guide to the progress the children were making
- most children liked Distar
- very poor students seemed to be improving
- an aide would be helpful.

The teachers said that they had made some modifications in the Distar program, but the extent and effect of these changes varied considerably.

There were a few negative comments. The half-hour lessons were too long for some pupils and too short for others. One teacher found it more difficult than usual to keep the children's attention. In two classes, a few children seemed to hold back the group and a few children were bored with repeating lessons.

The responses are presented in more detail in Appendix A.

Another questionnaire was given to the teachers in June. They were asked to give a further evaluation of Distar in terms of the children's achievement and the "plus-" and "minus-values" of the program. Their comments are recorded in Appendix B. All teachers thought the children had made good progress. In each subject area they had learned useful skills: the sounds and blending in Reading; counting, adding, the concept of equality, etc. in Arithmetic; good oral language skills and vocabulary in Language. Some children in each group were progressing better than others.

Some of the "plus-values" listed were:

- good reviews of vocabulary and skills
- repetition of lessons in the Take-Homes (Arithmetic)
- stories and pictures appeal to the children (Language and Reading)
- easy for the teacher to use; makes teaching more effective
- improved the ability of pupils to concentrate, listen, and respond well (Language)
- Take-Homes are a good incentive
- the children enjoy the lessons
- children make progress and thus don't feel frustrated.

Some of the "minus-values" listed were:

- lessons are too long and contain too much repetition (Arithmetic)
- no time left for other language activities
- "different" ways of presenting material, e.g., adding horizontally instead of vertically
- lessons sometimes are too noisy (Arithmetic).

C. Class Observations

The writer observed the three Distar classes and talked informally with the teachers. In general, both the teachers and the pupils appeared to enjoy Distar. Most children were well-behaved, took an active part in the lessons, and responded quickly to the teachers' questions. The lessons usually were fast-paced and lively.

The children in the Language and Reading groups enjoyed the stories and looked forward to that part of the lesson. The children in the Reading class were eager to do their Distar work; they were enthusiastic about reading and willingly read from their Take-Home stories. They read well and were able to sound out words that they were unsure of.

The only problems observed were distractions from pupils who weren't in the Distar group and that the lessons seemed a bit long for a few pupils.

SUMMARY

Distar was used in three Junior Learning Assistance Classes in Vancouver during the 1970-71 school year. Each class used the program for one subject area (language, reading or arithmetic).

The program was evaluated mainly in terms of the pupils' achievement and the teachers' opinions. Problems such as the small size of the groups, differences between the classes, and inadequate pre-testing, limit the scope of the evaluation.

The Canadian Cognitive Abilities Test was given to the pupils in January and May. There were significant differences among the groups on both pre- and post-tests. Most children gained both in total score and deviation I. Q. score. The gains in

scores of the three groups were not significantly different. The reading subtests of the Metropolitan Achievement Test (Primary I) were given to some pupils. The two pupils in the Reading group made the largest gains but no statistical analysis was done. The test results indicate little except that most children improved somewhat in the skills measured.

On the whole, the teachers were positive about Distar. They felt that the children had made reasonable progress and learned useful skills. They thought the material was good and not difficult to use. Only a few problems were mentioned such as the lessons being too long for some children and distractions from children not in the Distar group. The writer observed that the children seemed to enjoy their Distar lessons and did the work well. The enthusiasm in the Reading group was particularly noticeable.

Even though the test results are inconclusive, the teachers' assessments of Distar are generally positive. The teachers and children liked it and the pupils learned useful skills.

APPENDIX A

Summary of Questionnaire Responses, January, 1971

A questionnaire was given in January, 1971 to the three teachers using Distar. The responses are summarized below. Specific questions about class composition are not included here.

Questionnaire to Distar Teachers

1. Is the daily half-hour lesson
   a) a reasonable length? _____
   b) too long? _____
   c) too short? _____

   In the teachers' opinions, the half-hour lessons were of reasonable length for some pupils, too long for others, and too short for a few.

2. Do you find it difficult to keep the children's attention?
   a) no more difficult than on other work 2
   b) more difficult than on other work 1

3. Do you have an aide in the classroom? a) yes 1 b) no 2

4. Do you need more help? a) yes 2 b) no 1

5. Have you modified the Distar system you teach?
   a) quite a lot _____
   b) slightly 2
   c) not at all 1

6. Are the Take-Homes effective as rewards?
   a) yes 3
   b) no _____
   c) I have changed the Take-Homes to make them more effective 2

7. Do you teach Distar every day?
   a) almost always 3
   b) irregularly _____

8. Have you changed the instructions or formats?
   a) always follow the book _____
   b) have made a few changes 3
   c) have made many changes _____

9. Do you like the Distar system?
   a) yes 3 b) no _____ c) no opinion _____

10. Would you like to teach another Distar subject?
    a) yes 3 b) no _____ c) no opinion _____

11. In your opinion, could parts of the Distar systems, e.g., sound blending exercises, counting drills, be used in any class?
    a) yes 3 b) no _____ c) don't know _____

12. Do you think Distar is superior to most other methods for teaching slow learners? Distar is a) a better method 1
b) about the same as other methods 1
c) not as good as other methods _____
(no answer 1)

13. Do the children like Distar?
a) most of them like it 2
b) some do and some don't 1
c) most of them dislike it _____

14. Have comments from parents about Distar generally been
a) favorable? 1
b) unfavorable? _____
c) no comments 2

15. Are tests in the program a good guide to the progress children are making?
a) yes 2 b) no _____ c) don't know 1

16. Are many children bored with repeating lessons?
a) many _____ b) a few 2 c) none 1

17. Do one or two children seem to hold up the group, i.e., perform poorly or disturb the class? a) yes 2 b) no 1

18. Is Distar easy to use? a) easy 1 b) of average difficulty 1
c) difficult _____ (no answer 1)

19. In comparison to other lessons, Distar preparation takes
a) more time 1 b) less time _____ c) about the same amount of time 2

20. How do the children progress?
a) Most of them pass the tests in the books 3
b) Some of them pass the tests in the books _____
c) Few of them pass the tests in the books _____

21. Would you like to use Distar again?
a) yes 3 b) no _____ c) no opinion _____

22. If you had enough help, would you like to use more than one Distar system in your class?
a) yes 3 b) no _____ c) no opinion _____

23. Do you feel a special class would benefit from having all three Distar systems?
a) yes 1 b) no _____ c) don't know 2

24. Does Distar teach what you want it to teach?
a) yes 2
b) no _____
c) teaches some things and omits others 1

25. Does Distar seem to work equally well for all your children?
a) yes 1 b) no 2 c) don't know _____

If not, with which children does it work best? - those with better attention spans(1)
- those not emotionally disturbed (1)

26. The Distar systems are highly structured - same formats, signals, patterned responses from students. Do you like this structure?
a) yes 2 b) no _____ (no answer 1)

Do you think it is a good way to teach?
a) yes 3 b) no _____ c) don't know _____

27. Are the children learning the Distar material? a) yes 3 b) no _____

28. Do your very poor students seem to be improving?
a) yes 2 b) no _____ c) don't know 1

29. Do you feel confident teaching Distar?
a) yes 2 b) no _____ c) no opinion 1

30. Was your preparation to teach Distar adequate? a) yes 2 b) no _____

(no answer 1)

The teachers were asked for additional comments on Distar. These are listed below as "plus-values" and "minus-values". The teachers noted that it was difficult to assess the program at that point in the year.

31. Additional comments on Distar:

a) "plus-values" (benefits, advantages, strengths, good features)

- vocabulary building
- recognition of numerals and objects
- children love it
- excellent training at placing things in categories
- sequence training
- well-structured
- appealing illustrations, humorous stories
- ample drill without boring them
- much less difficult to keep children's attention.

b) "minus-values" (limitations, disadvantages, weaknesses, poor features)

- children get restless with so much repetition
- it's very slow
- books are cumbersome
- written work not encouraged.

APPENDIX B

The Teachers' Evaluation of Distar in June, 1971: Responses to a Questionnaire

1. Please comment on the children's achievement in the Distar subject you teach.

Language:
"All children have made a great deal of progress—but some more than others, possibly due to their better powers of concentration.
They have learned:

a) accuracy and precision in oral language
b) acceptable patterns in statements, with and without not; verb tenses, if-then, before-after statements; comparative and superlative statements, statements involving plurals (pronouns, verbs, nouns)
c) accuracy in identifying pictured objects, when given (orally) multiple attributes of these objects
d) a wide variety of new vocabulary—names of objects, categories, adjectives frequently used in instruction, etc."

Reading:
"... All the children, with the exception of one, have learned all the sounds and are able to blend quite effectively. Three of the boys have advanced considerably beyond the others and are able to supplement the Distar lessons with workbooks of the Sullivan series."

Arithmetic:
"... They have learned to recognize numerals to 20, as well as to write them. They have learned how to compute the answer by plussing a number to a given number... They have learned the concept of 'more or less'. They are counting backwards from 8. They understand equals (i. e. equality) and the majority of the 7 pupils can do the Take-Homes without much assistance. The pupils are learning all the processes and concepts according to the lessons... The pupils who have done arithmetic before show quicker understanding than the very slow learner... Considering the 'limited intelligence' of the pupils, I would say the pupils are progressing as favorably as can be expected."

2. List the "plus-values" (benefits, advantages, strengths, good features) of Distar.

Language:
"I believe one of its greatest strengths is the carefully-spaced reviews of vocabulary and skills, so that they do not weaken from disuse.

Good features:

- Stories and illustrations have child-appeal
- Teacher's part of lesson is clearly outlined and is easy to use...
- Constant practice in oral language
- Timid children happily participate in 'chorus' work, and thus gain confidence to speak alone
- Distar gives a much-enlarged vocabulary which helps the child's understanding in other lessons
- Child grows in ability to listen and to respond accurately
- Child grows in ability to note differences, likenesses, and characteristics being described. (I believe this carries over into general ability to have a plan of attack on a given problem.)
- Improved powers of concentration in oral lessons."

Reading:
"Distar removes all sense of frustration because all the children, even the slowest, feels he is progressing. Each lesson is exciting, the stories and pictures appeal to the child's sense of humour... I feel it has enabled me to be much more effective in teaching reading skills."

Arithmetic:
"The first lessons were excellent for sequence of shapes and colours. Other lessons included a variety of reasoning processes... the pupils now understand how to get the answer. Should they forget, there's plenty of 'repetition' in the 'Take-Homes' which are a good incentive... The lessons are enjoyed when there is a 'race' or a 'blast off'... rote counting and reasoning are good..."

3. List the "minus-values" (limitations, disadvantages, weaknesses, poor features' of Distar.

Language:

"I see few 'minus-values' because I feel Distar language does a tremendous job in a short space of time. However, I regret that my timetable leaves me practically no time for any other language activities, —creating stories, playing familiar ones, enjoying poems and stories in a leisurely manner, language games, and so on... I do realize that this is not an every-day every-year programme so possibly I should not regret the lack of other language activity while the Distar years are taught."

Reading:

"Because my group this year has been small the problems have been minimal but I can see how a larger group with several levels would be difficult without a trained Aide."

Arithmetic:

"1. The lessons are too long—a 20-minute lesson is long enough to keep a slow learner concentrating on one subject.
2. There is too much repetition of same type of questions. This not only bores the pupils but it is a strain on teacher's voice.
3. The lessons can become too noisy, when pupils are to 'shout-big'.
4. Making 10's as 1^{o} and teens as $1^{o}1$, $1^{o}2$, $1^{o}3$... etc. is confusing—not a natural way to form the numerals.
5. If a substitute is with class, and unfamiliar with Distar, the pupils are at a disadvantage if they don't understand numbers in a different way, e.g., Distar does plussing in a horizontal way, whereas most tests and other methods show adding vertically... "